REMARKS

Introduction

Claims 1-25 are pending in the application, of which, claims 1, 15, and 19 are independent. A ll pending claims stand rejected. In particular, claims 1-25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,424,529 (hereinafter "Eesley"), in view of U.S. Patent No. 6,421,239 (hereinafter "Huang"). Further, the Abstract of the disclosure stands objected to.

Upon entry of this amendment, which is respectfully requested, independent claims 1, 15, and 19, as well as dependent claim 17, will be amended to more distinctly claim current embodiments. Applicants have amended the claims solely to expedite prosecution of the present application (*i.e.*, not for reasons related to patentability) and reserve the right to pursue the subject matter of the originally filed claims in this application and in other applications. No new matter is believed added by this amendment. Support for all amendments exists in the specification and claims as originally filed, and all such matter is believed to have previously been searched by the Examiner.

Applicants respectfully request reconsideration and further examination of the pending claims in view of the arguments presented herein and in accordance with 37 CFR §1.112.

Objection to the Abstract

The Abstract is amended herein, as requested by the Examiner, to provide a clearer description of the nature and gist of the technical disclosure in accordance with MPEP §608.01(b). Applicants therefore respectfully request that the objection to the Abstract be withdrawn.

Claim Rejections Under 35 USC § 103(a)

All pending claims (claims 1-25) stand rejected as being unpatentable over Eesley in view of Huang. This ground for rejection is respectfully traversed as follows.

Applicants respectfully assert that Eesley and Huang, either alone or in combination, fail to teach or suggest embodiments as recited in independent claims 1, 15, and 19 (*e.g.*, as

amended). In particular, Eesley and Huang fail to teach or suggest a heat exchanger configured such that *a thermal boundary layer exists in substantially the entire porous medium.*

Eesley generally describes a heat sink having "a spreader plate, at least three fins and at least one porous reticulated foam block that fills the space between the fins." (Abstract). Eeasley further describes the precise configuration of the heat sink where the fins are "positioned adjacent to one another in a substantially radial configuration." (independent claims 1, 7, and 14; Fig. 2A and FIG. 2B).

In contrast, currently claimed embodiments (*e.g.*, as recited in amended independent claims 1, 15, and 19) comprise one or more fins coupled to a porous medium such that *a thermal boundary layer exists in substantially the entire porous medium*. According to currently claimed embodiments, for example, the "use of the porous medium may provide a gap that may be optimally sized for thermal dispersion." (pg. 6, lines 14-15; reference numerals omitted). In other words, the dimensions of the porous medium (*e.g.*, the thickness) may be configured to utilize substantially the entire porous medium to disperse heat. The thickness of the porous medium may be limited and/or defined, for example, to substantially coincide with the distance the heat may travel through the porous medium.

As described in the specification as filed, for example, the "porous medium may generally have a very large surface area and therefore may provide very efficient heat dissipation. The tortuous path the heat may need to take to travel through the porous medium may however generally limit the thermal conductivity from one end of the porous medium to the other. For example, heat traveling from the base into the porous medium may only be able to travel a short distance into the porous medium proximate to the base prior to being dissipated. This may thermally isolate the remaining portions of the porous medium that are distal from the base, rendering them ineffective for heat dissipation." (pg. 5, line 28 to pg. 6, line 6; reference numerals omitted).

The radial-finned heat sink described in Eesley is simply not configured to utilize substantially the entire porous medium to disperse heat. As the radius of the Eesley heat sink increases, for example, the thickness of the porous medium increases. At some point, such as near the extremities of the radial-finned heat sink's porous medium, the Eesley heat sink is likely to experience thermal isolation of portions of the pie-shaped porous medium due to the inability

of the heat to travel through the entire thickness of the porous medium. Eeasley does not contemplate such an occurrence much less describe a solution to fix the problem.

In contrast, currently claimed embodiments describe a configuration of an enhanced heat exchanger that utilizes a porous medium such that *a thermal boundary layer exists in substantially the entire porous medium.* In such a manner, for example, the heat sink may be substantially optimized and/or may realize an increase in efficiency due to the substantial prevention of thermal isolation of portions of the porous medium. In other words, at least because substantially the entire porous medium is utilized to dissipate heat, the efficiency of the heat exchanger is increased. Previous systems, such as Eesley, do not contemplate the limited travel capabilities of heat through the thickness of the porous medium and do not describe heat exchangers that are configured to establish a thermal boundary layer throughout the entire porous medium.

Applicants therefore respectfully assert that Eesley fails to anticipate (or render obvious) embodiments as recited in amended independent claims 1, 15, and 19, at least because the Eesley fails to teach or suggest a heat exchanger configured such that *a thermal boundary layer exists in substantially the entire porous medium.*

Huang fails to make up for the deficiencies of Eesley. Huang, for example, describes a relatively conventional heat pipe configuration to transfer heat from one region in a computing device to another (such as the heat transfer portion described in some currently claimed embodiments). Huang does not, however, describe the use of a porous medium in a heat exchanger, much less the use of a porous medium such that *a thermal boundary layer exists in substantially the entire porous medium.*

Applicants therefore respectfully assert that Huang fails to anticipate (or render obvious) embodiments as recited in amended independent claims 1, 15, and 19, at least because Huang fails to teach or suggest a heat exchanger configured such that *a thermal boundary layer exists in substantially the entire porous medium.*

Applicants therefore respectfully request that the §103(a) rejection of independent claims 1, 15, and 19 be withdrawn and that independent claims 1, 15, and 19 be allowed. Dependent claims 2-14, 16-18, and 20-25 are believed patentable at least for depending upon patentable base claims.

Further, amended dependent claim 17 is believed patentable because neither Eesley nor Huang teach or suggest the limitation recited in dependent claim 17. Neither Eesley nor Huang, for example, teach or suggest, either alone or in combination, establishing forced convection through the porous medium wherein the forced convection is accomplished using a blower fan *operable to direct air through the porous medium such that the air enters a first side of the porous medium and exists a second and opposing side of the porous medium*. Huang simply does not describe the use of a porous medium in a heat sink, while Eesley does not describe a heat sink configuration operable to accomplish such forced convection.

In Eesley, for example, the radial-finned heat sink is described and shown as being capable of receiving air (*e.g.*, from a fan) through a first surface of the porous medium (such as through the vertical surface adjacent to the base of the heat exchanger) and expelling the air through a second surface adjacent to the first surface (such as the top surface of the porous medium). In such a configuration, the air must necessarily perform a substantially ninety-degree turn as it flows through the porous medium. Such a turn may inhibit the airflow through the porous medium, reducing the effect of the forced convection.

In contrast, the limitation recited in claim 17 describes the air from the fan as being directed through a first side of the porous medium to a second and *opposing side* of the porous medium. In other words, the air travels substantially straight through the porous medium. This may, for example, increase the effectiveness of the forced convection.

Applicants therefore respectfully request that the §103(a) rejection of dependent claim 17 be withdrawn and that dependent claim 17 be allowed.

Further yet, the limitation recited in dependent claim 8 is also not taught or suggested by either Eesley or Huang. The compressive attachment method of coupling the porous medium between two metal fins is not described in either Eesley or Huang. As previously mentioned, Huang does not even describe the use of a porous medium in a heat exchanger. Eesley, while describing some uses for a porous medium, only describes attaching the porous medium using thermal bonding techniques such as conductive epoxy. Eesley does not describe compressive techniques of coupling, which may, for example, increase efficiency by directly coupling the porous medium and the metal fins (*e.g.*, no thermal grease or epoxy is required). Indeed, such a compressive coupling technique may not work properly with the radial configuration described

in Eesley. The pie-shaped porous medium pieces of Eesley may not, for example, properly couple to the metal fins using compression alone.

Applicants therefore respectfully request that the §103(a) rejection of dependent claim 8 be withdrawn and that dependent claim 8 be allowed.

CONCLUSION

Accordingly, Applicants respectfully request allowance of the pending claims. If any issues remain, or if the Examiner has any further suggestions for expediting allowance of the present application, the Examiner is kindly invited to contact the undersigned via telephone at (203) 972-4982.

Respectfully submitted,

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Date

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